Applied Magnetic Resonance 2010 vol.39 N4, pages 347-356

EPR/FMR Investigation of Mn-Doped SiCN Ceramics

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Abstract

SiCN magnetic ceramics doped with Mn 2+ ions were synthesized at the pyrolysis temperature of 1,100°C, using CERASET™ as liquid polymer precursor and polymer manganese(II) acetylacetonate as dopant, and investigated by electron paramagnetic resonance (EPR)/ferromagnetic resonance (FMR) technique. The predominant source of ferromagnetism in SiCN samples doped with Mn ions, as synthesized here, is the ensemble of ferromagnetic nanoparticles of Mn 5Si 3C x incorporated into the amorphous SiC/Mn structure. The fluctuation of magnetization due to ferromagnetic Mn 5Si 3C x particles significantly broadens the EPR lines at the phase-transition temperature (363 K). This is the first fabrication of a SiCN/Mn ceramic, which exhibits room-temperature ferromagnetism. © 2010 Springer-Verlag.

http://dx.doi.org/10.1007/s00723-010-0163-7